

in a peak emission measurement it is necessary to apply a PDCF to obtain the total peak emission level.¹³⁹ The requirement to apply a PDCF was contained within the Commission's specified measurement procedure, ANSI C63.4.¹⁴⁰

53. The Commission amended its regulations to change the reference to ANSI C63.4-1992 to a more recent version, ANSI C63.4-2001.¹⁴¹ The Commission adopted this revision stating that ANSI C63.4-2001 provides clarifications to the measurement procedure and to the configuration of the equipment under test but does not contain any significant changes. However, a subsequent examination of the 2001 version of ANSI C63.4 reveals that the reference to HP Application Note 150-2, as contained in ANSI C63.4-1992, has been replaced with a reference to ANSI C63.22, a procedure that exists only in a draft format and does not appear to address PDCF. While this change in ANSI C63.4 has further obscured when a PDCF must be applied, it does not negate the need to apply a PDCF under certain measurement conditions. The requirement to employ a PDCF continues to be part of the operating instructions on the proper use of a spectrum analyzer. Our clarification to the regulations should eliminate any confusion on the need to apply a PDCF under certain modulation and measurement conditions.

54. We are denying the request from MSSI for an interpretation of Section 15.35(b) of the Commission's rules that a PDCF does not apply above 1 GHz. MSSI made a similar request for interpretation in its Petition for Reconsideration of the *Ist R&O*.¹⁴² However, the Commission was clear in the *MO&O* that a PDCF does apply to the measurement of peak emission levels from non-UWB devices.¹⁴³ The existing requirement to apply a PDCF in determining the peak power associated with the measurement of narrow pulsed emissions was discussed throughout the UWB rule making proceeding.¹⁴⁴ Further, the Commission has been clear that the measurement of a peak emission for a non-UWB device, as specified under Section 15.35(b), could require the use of a PDCF depending on the technical parameters of the pulsed emission. The requirement to apply a PDCF is irrespective of the frequency at which the measurement is performed.¹⁴⁵ We agree with the statement submitted by MSSI from Synergent Technologies that a PDCF is not required to determine the potential interference effects of a wideband

¹³⁹ For a Fourier line spectrum, i.e., where the resolution bandwidth (RBW) is less than 0.3 times the pulse repetition frequency (PRF), the pulse desensitization factor is equal to $20 \log [(\text{effective pulse width}) (\text{PRF})]$ dB.

¹⁴⁰ 47 C.F.R. § 15.31(a). See, also, *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz*, ANSI C63.4-1992, at pg. 62 and 90. This measurement procedure specified that HP Application Note 150-2 should be employed to determine the PDCF, as necessary. See Hewlett-Packard Co. Application Note 150-2, *Spectrum Analysis – Pulsed RF*, November 1971.

¹⁴¹ See *Second Report and Order and Memorandum Opinion and Order* in ET Docket No. 01-278, 18 FCC Rcd 14741 (2003). The Commission recently amended its regulations to reference ANSI C63.4-2003. See *Report and Order* in ET Docket 03-201, 19 FCC Rcd 13539 (2004). ANSI C63.4-2003 has the same text regarding PDCF that was contained in ANSI 63.4-2001.

¹⁴² MSSI Petition for Reconsideration of 6/14/02 at pg. 2-9.

¹⁴³ *MO&O*, *supra*, at para. 146.

¹⁴⁴ *Notice of Inquiry* in ET Docket No. 98-153, 13 FCC Rcd 16376 (1998), at para. 5 and 13; *Notice of Proposed Rule Making* in ET Docket No. 98-153, 15 FCC Rcd 16376 (2000), at para. 4, 35, 48, 51 and 53; *Ist R&O*, *supra*, at para. 8 and 236; *MO&O*, *supra*, at para. 143-146. As previously explained by the Commission, the requirement to apply a PDCF is not contained in Section 15.35(b) of the rules. Rather, this requirement is specified in HP Application Note 150-2, *supra*, which contains the instructions on how to measure pulsed emissions using a spectrum analyzer. See 47 C.F.R. §§ 15.31(a)(3) and 15.35(b).

¹⁴⁵ On frequencies where the emission limit is based on the use of a quasi-peak detector, there is no requirement to apply a peak emission limit and, consequently, no requirement to apply a PDCF.

pulsed waveform¹⁴⁶ but we do not agree to MSSI's characterization that this comment means HP Application Note 150-2 is not applicable.¹⁴⁷ Synergent's statement means only that the total peak power of a UWB emission is not required to determine the potential interference, as previously recognized by the Commission; it is the level of the undesired power in the bandwidth employed by a victim receiver that is important. This is the reason that the Commission applied the UWB peak measurement only to a relatively narrow, 50 MHz wide portion of the UWB emission. Accordingly, we do not agree that the rules should be interpreted in the manner requested by MSSI. As proposed in the *FNPRM*, we are clarifying the rules by stipulating that the peak emission limit for non-UWB devices is based on the total peak energy radiated by the device, unless specifically stated otherwise, and that, depending on the characteristics of the signal, it may be necessary to apply a pulse desensitization correction factor to the peak measurement of a non-UWB emission.

E. UWB definition

55. UWB definition. In the *FNPRM*, the Commission indicated that it was sympathetic to the concerns expressed by MSSI, Siemens and others throughout this proceeding regarding the changes in operational standards for unlicensed devices that may apply simply due to the bandwidth of the transmission system. It added that the Commission's standards in Part 15 need to reflect emission limits that reduce the potential for causing harmful interference to authorized radio services. While the emission limits applied to UWB operations ensure a low probability of causing harmful interference, they also require that the transmissions occupy a minimum bandwidth of 500 MHz or a minimum fractional bandwidth of 0.20.¹⁴⁸ The Commission indicated that this minimum bandwidth requirement could cause a manufacturer to design transmitters that occupy more bandwidth than is operationally necessary or transmitters that inject noise to increase the occupied bandwidth simply to permit operation under the UWB regulations. The Commission was concerned that such systems would place greater energy in frequency bands where operation is not necessary for the system to function. Thus, the Commission concluded that a minimum bandwidth standard could be counterproductive to reducing the potential for harmful interference and proposed to eliminate the definition of an ultra-wideband transmitter in 47 C.F.R. § 15.503(d).¹⁴⁹ The Commission proposed to permit the operation of any transmission system, regardless of its bandwidth, as long as it complies with the standards for UWB operation set forth in Subpart F of 47 C.F.R. Part 15 and to base the resolution bandwidth used for the peak power measurement to 10 percent of the -10 dB bandwidth of the emission. Comments were requested on these proposals as well as on any potential increase or decrease in interference potential to authorized radio services that could be caused. The commenters were requested to address the interference potential from narrowband systems operating under the UWB regulations. The comments also were asked to address whether additional standards, such as a spectral power density limit based on a bandwidth narrower than 1 MHz, are needed.

56. Comments. Delphi, SARA and Siemens VDO support elimination of the minimum bandwidth requirements.¹⁵⁰ Delphi states that the minimum bandwidth specification is an unnecessary

¹⁴⁶ MSSI comment of 7/21/03, at Attachment 6.

¹⁴⁷ MSSI Request for Immediate Clarification of Section 15.35(b), February 12, 2003, at pg. 2 and 5, attached to MSSI comment of 7/21/03.

¹⁴⁸ The fractional bandwidth, as defined in 47 C.F.R. § 15.503(c), is equal to the -10 dB bandwidth of the emission divided by the center frequency. In simple terms, a fractional bandwidth of 0.20 means that the -10 dB bandwidth is 20 percent of the center frequency.

¹⁴⁹ It is the limit on emission levels, particularly the limit on spectral power density, that primarily controls interference potential.

¹⁵⁰ Delphi comments of 7/18/03 at pg. 2 and 8; SARA comments of 7/21/03 at pg. 2-3; Siemens VDO comments of 7/21/03 at pg. 15-22.

constraint that hampers spectrum use without added interference protection and adds that some applications require a variable bandwidth. SARA and Siemens VDO support the bandwidth measurement procedures proposed by Siemens VDO if the minimum bandwidth is not eliminated. SIA believes that this change to the rules should be made only on a case-by-case basis stating that UWB is at an early stage of development and the technology is likely to change significantly.¹⁵¹ SIA expresses particular concern that eliminating the minimum bandwidth requirement will increase aggregate interference to FSS receivers. XSI opposes elimination of the UWB minimum bandwidth stating that this would increase the threat of interference without promoting flexibility.¹⁵² XSI notes that there is ample spectrum outside of the restricted bands to accommodate devices with less than the minimum UWB bandwidth. XSI believes that changing the rules at this time will result in increased uncertainty and confusion and will further delay commercial availability of UWB devices. NTIA opposes eliminating the bandwidth requirements, stating that the supporting comments offer no technical support and expressing concern that such a change would permit operation in the restricted bands regardless of the bandwidth of the unlicensed emission.¹⁵³ NTIA adds that all of the interference analyses it performed were based on the use of wideband, impulsive emissions and did not address narrowband signals.

57. Discussion. We have accommodated the narrowband operations sought by Delphi, SARA and Siemens VDO through our amendments to the peak power levels for unlicensed operation in the 5925-7250 MHz, 16.2-17.7 GHz and 22.0-29.0 GHz bands while, at the same time, keeping any further expansion of equipment applications out of the sensitive restricted bands. Because of these changes, we see no necessity at this time to eliminate the UWB minimum bandwidth requirements. We agree with XSI that such changes could be disruptive and could further delay the introduction of UWB devices. Further, we continue to believe that any operation in the restricted bands should be subject to the additional technical standards and operational parameters specified in the UWB regulations. Accordingly, we see no reason to change the minimum bandwidth requirements for UWB devices until additional experience has been gained with this equipment.

F. Other issues raised in the comments

58. Delphi, with support from SARA, requested that the Commission amend its rules to permit the operation of UWB devices above 10.6 GHz.¹⁵⁴ Northrop Grumman and Raytheon requested the Commission to "clarify" that the sale of UWB vehicular radars is limited to original equipment manufacturer installed units or to qualified dealer retrofits to other vehicles where the manufacturers can show that the standards, e.g., the attenuation of emissions in the 23.6-24.0 GHz band above the horizontal plane, are met, adding that under no circumstances should these devices be permitted for retail sale.¹⁵⁵ These issues are effectively untimely requests for reconsideration of issues that were already addressed by the Commission in the *1st R&O*. Accordingly, they are denied.

IV. SECOND MEMORANDUM OPINION AND ORDER

59. In the *MO&O* and *FNPRM*, the Commission responded to fourteen petitions for reconsideration that were filed in response to the *1st R&O*, including petitions from Cingular and SIA. In general, the Commission denied the petitions for reconsideration, adopting changes to its regulations only

¹⁵¹ SIA reply comments of 8/20/03 at pg. 5.

¹⁵² XSI reply comments of 8/20/03 at pg. 1-5.

¹⁵³ NTIA comments of 1/15/04 at pg. 23-25.

¹⁵⁴ Delphi comments at pg. 1, 5-6.

¹⁵⁵ Northrop Grumman and Raytheon reply comments of 8/20/03 at pg. 1-2 and 8.

to facilitate the operation of UWB devices used as ground penetrating radar ("GPR") systems¹⁵⁶ or as through-wall imaging systems operated by law enforcement, emergency rescue or firefighter personnel in emergency situations. The regulations also were clarified regarding the coordination requirements for imaging systems and the limits on emissions produced by digital circuits associated with UWB operation. No changes were made to the type of UWB devices permitted to operate under the regulations. The frequency bands within which UWB devices are constrained to operate were not changed except as follows: GPRs were allowed to operate on any frequency and through-wall imaging systems were permitted to operate with a center frequency between 1990 MHz and 10,600 MHz. The emission limits applicable to UWB devices were not changed except as follows: the emissions from through-wall imaging systems were relaxed by 7 dB, to an RMS average limit of -46.3 dBm/MHz EIRP, within the band 960-1610 MHz and by 10 dB, to an RMS average limit of -41.3 dBm/MHz EIRP, within the band 1610-1990 MHz.

60. Petitions for reconsideration of the *MO&O* were filed by Cingular and by SIA.¹⁵⁷ Cingular objects to the presence and level of emissions from UWB devices that may appear in the frequency bands allocated for the Cellular Radiotelephone Service ("cellular") and for the Personal Communications Services ("PCS"), claiming that the Commission can not legally permit the unlicensed operation of radio frequency ("RF") devices except as specifically authorized by Congress under 47 U.S.C. 307(e). Cingular also believes that cellular and PCS licensees have exclusive use of the spectrum and that any emissions from UWB devices undermine this exclusivity. SIA argues that the emission limits in the 3650-4200 MHz band used by C-band FSS stations are excessive and will result in harmful interference. XSI filed comments in response to the Cingular petition and Cingular filed a reply comment.¹⁵⁸ XSI also filed comments in response to the SIA petition, the Coalition of C-Band Constituents filed a letter supporting SIA's petition,¹⁵⁹ and SIA filed a late reply comment along with a motion for an extension of the reply comment period. That motion is granted and SIA's reply comment is accepted.

A. Interference to PCS and Cellular

1. Background

61. On June 17, 2002, Cingular filed a Petition for Reconsideration of the *1st R&O*. In that petition, Cingular claimed that the cellular and PCS spectrum are exclusive bands; that there was no reasonable basis for the Commission to allow UWB operations when such operations were not permitted under the previous Part 15 rules; that the UWB decision was not based on an adequate analysis of the interference that would be posed to cellular and PCS operations; that the Commission rejected all evidence concerning the operating levels used by PCS systems; that the UWB emission limits would cause interference to CDMA PCS systems; that there was no evidence that the Commission considered signal levels used by TDMA or GSM systems; that UWB interference to PCS jeopardizes E-911 operations; that lower emission limits are needed for indoor UWB devices to protect PCS operations; and that UWB imaging systems must provide site-by-site coordination with cellular and PCS licensees. The

¹⁵⁶ The reference to GPRs also includes wall imaging systems. Wall imaging systems are the same as a GPR except a GPR is used to look down into the ground while a wall imaging system may be used to look into a wall or ceiling. The wall or ceiling must be a physical structure that is dense enough and thick enough to absorb the majority of the signal transmitted by the device. Examples include the walls in a mine and concrete structures.

¹⁵⁷ A third petition for reconsideration was filed by MSSSI. As noted earlier, this petition was dismissed under the delegated authority of the Chief, Office of Engineering and Technology, by letter dated August 4, 2003.

¹⁵⁸ XSI filed *ex parte* comments responding to Cingular's response.

¹⁵⁹ This letter was filed in the time frame for reply comments to SIA's petition.

Commission rejected these claims in the *MO&O*.¹⁶⁰

62. On February 12, 2003 after the close of the filing window for petitions for reconsideration for the *R&O* and on the day before the Commission adopted the *MO&O*, Cingular filed a "Supplement to Petition for Reconsideration." In the supplement, it argued that Section 301 of Act precluded the widespread deployment and operation of UWB devices without a license. The Commission dismissed the filing for procedural violations of the rules.¹⁶¹

63. On May 22, 2003, Cingular filed the instant Petition for Reconsideration ("petition") of the *MO&O* forwarding arguments that were raised in its past petition and filings. In the petition, Cingular requests reconsideration claiming that the Commission's rule making proceeding was deficient in three respects. First, Cingular reiterates its claim that the authorization of Part 15 devices on an unlicensed basis violates Section 301 of the Communications Act of 1934, as amended (hereafter referred to as "the Act").¹⁶² Second, Cingular again raises its claim, as previously argued in its Petition for Reconsideration of the *1st R&O*,¹⁶³ that the Commission's authorization of UWB devices was performed without an adequate record to demonstrate that harmful interference would not be caused to cellular, PCS and E911 operations.¹⁶⁴ Third, Cingular also repeats the claim forwarded in its Petition for Reconsideration of the *1st R&O* that the rules adopted fail to adequately protect the rights of incumbent commercial mobile radio service ("CMRS") licensees, *i.e.*, cellular and PCS licensees, by undermining the exclusivity rights of the licensees, by failing to include these licensees in a coordination process with UWB operators, and by failing to lower the emission limits for indoor UWB devices.¹⁶⁵

2. Unlicensed Part 15 operation and 47 U.S.C. 301

64. Cingular argues that the authorization of UWB devices on an unlicensed basis violates Section 301 of the Communications Act. Cingular notes that one of the central reasons for creating the Commission was Congress' intent to reduce interference among spectrum users, and that by enacting Section 301, Congress prohibited wireless transmissions without a license. In particular, Cingular asserts that Section 301 requires that any person who uses or operates "any apparatus for the transmission of energy or communications by signals by radio" must do so by virtue of a "license granted under the provisions of the Act."¹⁶⁶ Cingular further argues that Congress established detailed procedures in the Act for obtaining a license and notes that the threshold requirement for obtaining a license, which is

¹⁶⁰ *MO&O, supra*, at para. 55-97.

¹⁶¹ *MO&O, supra*, at para. 151. The Commission concluded that the statutory argument was a new argument, not contained in Cingular's original reconsideration petition and thus constituted a new petition that was untimely filed under Section 1.106(f) of our rules. The Commission also noted that, even if the filing could be considered a supplement to the original petition, Cingular did not file a motion for leave to accept the late-filed pleading as required by Section 1.106(f) of our rules nor serve the pleading on other parties to the proceeding.

¹⁶² See 47 U.S.C. 301. While Cingular worded its petition to apply only to UWB devices, a ruling that Part 15 unlicensed operation is in violation of Section 301 of the Act would affect all Part 15 unlicensed transmission systems and would not be limited to only UWB devices.

¹⁶³ Cingular Petition for Reconsideration of 6/17/02 at pg. 5-7, 10-14 and 20-21.

¹⁶⁴ The Cellular Radiotelephone Service operates at 824-849 MHz and 869-894 MHz; PCS operates at 1850-1910 MHz and 1930-1990 MHz; and GPS operates at 1164-1240 MHz and 1559-1610 MHz. The actual GPS frequencies are 1575.42 ± 12 MHz for the L1 band, 1227.60 ± 12 MHz for the L2 band, and 1176.45 ± 12 MHz for the L5 band.

¹⁶⁵ Cingular Petition for Reconsideration of 6/17/02 at pg. 7, 14-20, and 21-24.

¹⁶⁶ 47 U.S.C. § 301; see also Cingular Petition for Reconsideration of 5/22/03 (citing the Act).

contained in Section 308(a), requires the submission of an application.¹⁶⁷ Acknowledging that the Commission first established rules for unlicensed devices in 1938, Cingular points out that the Commission allowed unlicensed operations because it believed that the statutory requirement for licensing only applied to interstate operations, *i.e.*, radiation from operating certain devices would be kept to low limits and would not cause interference to interstate communications which would otherwise bring such operations within the licensing requirement of Section 301.¹⁶⁸ Cingular notes that Congress amended Section 301 in 1982 to clarify that the Commission's authority applies to intrastate and interstate communications, and thus Cingular argues the Commission lost its purported basis for allowing certain devices to operate without a license.

65. Cingular also argues that Section 301, as well as several other relevant provisions of the Act discussed below, are not ambiguous and that the Commission is not entitled to deference in construing their terms. In opposition to XSI's assertion that unlicensed operations are authorized under Section 302(a) of the Act, Cingular argues that Section 302(a) was enacted in 1968 to give the Commission authority to prohibit the manufacture of equipment that is capable of causing interference but does not contravene the Commission's authority under Section 301 to authorize the operation of equipment.¹⁶⁹ Cingular further rebuts XSI's assertion regarding Section 302(a) by noting that Congress has directed that only four services may operate without site-specific licenses pursuant to Section 307(e) of the Act,¹⁷⁰ and that to accept XSI's assertion regarding Section 302(a) would render Section 307(e) meaningless.¹⁷¹ Also, Cingular rejects XSI's argument that Congress was aware of unlicensed operations and tacitly accepted them when it enacted Section 302(a) and took other legislative actions,¹⁷² arguing that the "doctrine of legislative acquiescence" is only an auxiliary tool that is used in interpreting ambiguous statutory provisions and that Section 302(a) was added to the Act approximately 30 years after the Commission first adopted rules for unlicensed operations. Likewise, Cingular rejects XSI's attempts to rely on subsequent legislative history to infer Congressional intent regarding Section 302(a), arguing that there is no need to resort to legislative history when a statute is clear. Thus, Cingular rejects XSI's assertion that the Commission is entitled to deference in construing its authority under Section 302(a) and that the Commission can "fill in the gaps" of a statute.¹⁷³

¹⁶⁷ 47 U.S.C. § 308(a); *see also* Cingular Petition for Reconsideration of 5/22/03 at pg. 10 (citing the Act and discussing the submission of an application as a prerequisite to obtaining a license under Section 308(a)).

¹⁶⁸ Communications Amendments Act of 1982, P.L. 97-259; H.R. Conf. Rep. No. 97-765 at 31-32 (1982), reprinted in 1982 U.S.C.C.A.N. 2261, 2275-76 (citing *Fisher's Blend Station*, 297 U.S. 650, 655 (1936)) (discussing Congress' intent that the amendment make Section 301 consistent with prior judicial decisions finding that all radio signals are inherently interstate).

¹⁶⁹ 47 U.S.C. § 302a; Cingular reply comments of 9/17/03.

¹⁷⁰ Cingular Petition for Reconsideration of 5/22/03 at pg. 12

¹⁷¹ *See* Cingular reply comments of 9/17/03 at pg. 8. Cingular also notes that Section 307(e) was added to the Act in 1982, when Congress amended Section 301 to clarify the Commission's intrastate jurisdiction over radio.

¹⁷² *See* XSI comments of 9/4/03 at pg. 14-15. XSI points to three legislative actions in support. Enacting Section 302a Congress specifically discussed the need for proper regulation of garage door openers, a category of Part 15 device; enacting the Electronic Communications Privacy Act of 1986, Congress noted that cordless telephones operate under Part 15 of the Commission's rules "and are not licensed;" Congress instructed the Commission in the Balanced Budget Act of 1997 to auction off certain frequency bands which, among other criteria, had not then been allocated or authorized for unlicensed use pursuant to part 15 of the Commission's regulations (47 C.F.R. Part 15). *See* P.L. 90-379, S. Rep. 1276, reprinted at 1968 U.S. Code Cong. & Admin. News 2486, 2488; 41 P.L. 99-508, H. Rep. 99-647, 99th Cong., 2d Sess. at 33 (June 19, 1986); P.L. 105-33 Section 3002(c)(1)(C)(v), 11 Stat. 261. (1997).

¹⁷³ *See* Cingular reply comments of 9/17/03 at pg. 8.

66. We observe at the outset that the legal arguments Cingular raises here with respect to decisions in the R&O were addressed by the M&O and properly dismissed due to three clear procedural violations.¹⁷⁴ Given the last minute attempt by Cingular to interject the legal arguments into the reconsideration of the R&O (the pleading was filed the day before the Commission adopted the M&O) it hardly appears that the procedural violations were inadvertent, but rather were intended to perhaps deprive the Commission of adequate time to consider them, possibly giving Cingular an advantage in any appeal.¹⁷⁵ This circumstance provides added support for our decision that Cingular's repetitious legal arguments need not be considered under the Commission's rules.¹⁷⁶

67. Nonetheless, we address here the substance of Cingular's arguments in order to underscore the lawfulness of the actions taken in this docket and the reasonableness of the regulatory approach the Commission has devised to meet its statutory obligations to control the use of spectrum. We conclude that the language of Section 301 of the Communications Act does not mandate the type of licensing that Cingular suggests is required. Cingular's reading of the statute, moreover, ignores the practical realities that inform any reasonable reading of the statute and the nearly 70 years of "unlicensed" operations authorized by the Commission under Part 15. Congress is entirely familiar with this regulatory structure and for many years has indicated its acceptance of the Commission's approach.¹⁷⁷

68. Cingular's reading would require the Commission to apply Section 301's licensing requirement to any apparatus that transmits any amount of energy, no matter how negligible.¹⁷⁸ The statute does not compel that interpretation. Although Congress referred to "any apparatus," the statute is not phrased in terms of "any" energy, "any degree" of energy, or "any level" of energy. If we read such limiting language into the statute, the Commission would be required to individually license all devices that are designed to transmit any amount of energy for any purpose, with or without effect on the use of the spectrum for communications purposes. As discussed in greater detail below, such a result would lead to irrational results and stand at odds with Congress's recognition and tacit acceptance over the years of the Commission's Part 15 "unlicensed" regime. A more reasonable reading of Section 301, consistent with Congress's intent and subsequent legislation, would limit the licensing requirement to any apparatus that transmits enough energy to have a significant potential for causing harmful interference. Under our reading of the statute, the UWB transmission systems – because of their operating limits as prescribed in

¹⁷⁴ See fn 161 *supra*.

¹⁷⁵ Courts have considered the problem raised by last minute arguments that are submitted to an agency in ways that may deprive the agency of a fair opportunity to consider them, and then see a petitioner challenge the agency's failure to consider the arguments on appeal. The Court in *MCI Worldcom, Inc. v. FCC*, 760 F. 3d 760 (D.C. Cir. 2000) considered the Commission's failure to respond to a subtle suggestion in a single paragraph in an AT&T *ex parte* filed after the comment period had ended. The petitioners had challenged the failure to respond on appeal. The Court ultimately held that the argument was presented—if barely—to the Commission. *Id.* at 765. But the Court's holding was undoubtedly influenced by the fact that the *ex parte* was "suitably filed." *Id.* Here, the legal arguments by Cingular clearly were not suitably filed. Cingular's only defense to its action is that another party had raised the same Section 301 issue before the Commission. See Cingular Petition for Reconsideration of 5/22/03 at pg. 11. However, the party Cingular speaks of, ARRL, did not raise the issue in this proceeding. It had raised the issue in another proceeding, but has since abandoned the argument. See, *Amendment of Part 15 of the Commission's Rules to allow certification of equipment in the 24.05-24.25 GHz band at field strengths up to 2500 mV/m*, ET Docket No. 98-156, *Memorandum Opinion and Order*, 18 FCC Rcd 15, 944 (2003).

¹⁷⁶ 47 C.F.R. § 1.429(d)(i).

¹⁷⁷ See *Hernstadt v. FCC*, 677 F.2d 893, 902 n.22 (D.C. Cir. 1980) (Congress presumed to be cognizant of and legislate against background of existing agency interpretation of law); *Sweet Home v. Babbitt*, 17 F.3d 1463, 1471 (D.C. Cir. 1994) (same), *rev'd on other grounds*, 55 U.S. 687 (1995).

¹⁷⁸ Section 301 imposes a licensing requirement on a person who uses or operates "any apparatus for the transmission of energy or communications or signals by radio." 47 U.S.C. § 301.

this proceeding – are properly classified as Part 15 devices and are not required to be licensed on a formal basis.

69. The Commission first adopted rules for unlicensed operation of low power radio devices in 1938, and the basic construct of this regulatory regime continues to apply today.¹⁷⁹ The Commission took this action because it concluded that lower power radio frequency devices could be used on a widespread unlicensed basis, consistent with the public interest, if the Commission regulated their technical capabilities to ensure that they did not interfere with the orderly operation and development of radio communications.¹⁸⁰ The requirements for unlicensed operation are codified in Part 15 of the Commission rules and apply to a wide variety of emissions and devices, including intentional, unintentional and incidental radiators.¹⁸¹ These requirements ensure that such “apparatus” do not transmit energy in a way that has a significant detrimental effect on the operation or development of the nation’s communications network.

70. In setting up the Part 15 regime, the Commission realized that any attempt to license *all* transmitters of radio frequency energy would be infeasible and contrary to Congress’s intent in establishing a “rapid, efficient, Nation-wide, and world-wide wire and radio communication service.”¹⁸² In this regard, the Commission has long recognized that numerous devices emit radio frequency energy, often at very low levels, and that such devices may be operated by numerous individual users, making

¹⁷⁹ The Commission issued in August 1938 a notice for an informal conference with the Chief Engineer on proposed rules and regulations for low power radiofrequency devices, which it described as those, primarily used by the public, that use radiofrequency current as essential to their operation (e.g., radio control devices, record players) and that may cause interference to radio communications. Following a hearing held in September 1938 with various companies and associations representing both low power radiofrequency devices and radio communications services (e.g., National Association of Broadcasters, Philco Radio and Television Corp, AT&T, Electro Medical Equipment Manufacturers, Westinghouse Electric Co.), the Commission issued a press release on November 21, 1938 (No. 30678) announcing the adoption of rules and regulations for low power radiofrequency electrical devices. The Commission decided that if a low power device did not exceed the adopted field strength limit and did not cause interference to radio reception, the device would not have to be licensed. The original rules also provided that the Commission would inspect and test devices to determine whether they met the adopted field strength limits and issue a certificate specifying conditions of operations to any party making such a request. As the number of radiofrequency devices has increased, technical knowledge has expanded, and measurement procedures have improved, the Commission has modified the rules for the operation of unlicensed operations over the years, including an equipment approval program. The rule modifications over time in Part 15 have had the consistent goals of protecting licensed operator rights and benefits, and protecting the licensees themselves from any harmful interference. At the same time the rules promote benefits to the mass consumer market through the availability of desirable and affordable low power radiating devices of many types, used in daily life, that can best be provided on an unlicensed (but not on an unregulated) basis.

¹⁸⁰ *Id.*

¹⁸¹ 47 C.F.R. § 15.3 defines three classes of radio frequency emitters as follows:

(n) Incidental radiator. A device that generates radio frequency energy during the course of its operation although the device is not intentionally designed to generate or emit radio frequency energy. Examples of incidental radiators are dc motors, mechanical light switches, etc.

(o) Intentional radiator. A device that intentionally generates and emits radio frequency energy by radiation or induction.

(z) Unintentional radiator. A device that intentionally generates radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

¹⁸² 47 U.S.C. § 151.

individual licensing of users impractical.¹⁸³ Recognizing that the identification and individual licensing of all devices that affected or relied upon radio frequency energy was not practical, the Commission, very early in its existence, interpreted Section 301 not to require the licensing of devices that did not transmit energy in a manner that had any real potential to affect the Nation's communications network adversely. In adopting this reading of the statute, the Commission recognized that many devices that operate at very low power levels and at very short distances are unlikely to cause harmful interference and thus would not need to be individually licensed.

71. The requirements that apply to Part 15 devices ensure that emissions from such unlicensed apparatus do not rise to the level that would require licensing. For example, relying on its authority under Section 301 to prohibit certain radio uses ("No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio...except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act."), and under Section 303(f) to make "regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this Act,"¹⁸⁴ the Commission prescribes technical requirements which, if exceeded, would require the user of a device to acquire an individual license or to cease operation. Thus, although certain devices are unlicensed, they are still subject to appropriate regulation to ensure that they do not cause harmful interference to authorized users of the spectrum. Further, it is expressly stated in Part 15 of the Commission's rules that this rule part sets out the regulations under which one may operate without an individual license, and that any operation that is not in accordance with the Part 15 regulations must be licensed under Section 301 unless exempted elsewhere in the rules.¹⁸⁵ Rather than require all users to be individually licensed initially, the Commission has put users on notice that, under certain circumstances, it will require an individual license or prohibit their operations. This approach has proven to be an effective means for the Commission to achieve the stated purposes of the Act ("...to maintain the control of the United States over all the channels of radio transmission; and to provide for the use of such channels...by persons for limited period of time, under licenses granted by Federal authority...")¹⁸⁶ without imposing a licensing requirement on all individual users of all devices that emit radio frequency energy.¹⁸⁷

¹⁸³ The Commission recognized in 1938 that many different kinds of devices produced electromagnetic or induction fields at radio frequencies, even if they did not employ radio frequency current or the fields generated as essential to the functioning or purpose of the device's operation (e.g., switch contacts, automobile ignitions, diathermy machines, induction furnaces, oscillators in certain radio receivers). *See supra* footnote 179. Today, the use of unlicensed devices has become pervasive. For example, the Consumer Electronics Association estimates that there is an installed base of more than 348.23 million Part 15 consumer electronic devices. That is more than one for every US citizen. *See* OSP Working Paper Series Number 39, *Unlicensed and Unshackled: A Joint OSP-OET White Paper on Unlicensed Devices and Their Regulatory Issues*, May 2003, at pg. 22 (this report includes additional data on the increase in the use of various unlicensed devices, such as cordless telephones, wireless local area networks, spread spectrum devices, and WiFi).

¹⁸⁴ 47 U.S.C. §§ 301, 303(f).

¹⁸⁵ *See* 47 C.F.R. § 15.1(a) (providing that Part 15 sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license); 47 C.F.R. § 15.1(b) (requiring operation of an intentional or unintentional radiator operate in conformity with the regulations of Part 15 or be otherwise licensed or exempted).

¹⁸⁶ 47 U.S.C. § 301.

¹⁸⁷ *See, generally, In The Matter Of Revision Of Part 15 Of The Rules Regarding The Operation Of Radio Frequency Devices Without An Individual License*, GEN. Docket No. 87-389, *Report and Order*, FCC 89-103, 66 Rad. Reg. 2d (P & F) 295 (Apr. 18, 1989) (weighing benefits of non-licensed operations and concerns for interference potential under Part 15 rules); *Amendment of Part 15 of the Commission's Rules Governing Restricted Radiation Devices Concerning Low Power Communication Devices*, Docket No. 9288, *Memorandum Order and Opinion*, FCC 57-1311, 13 RR 1546h, para. 12 (July 31, 1957) (weighing the adopting of licensing schemes that (continued...))

72. Further, we disagree with Cingular that the Commission -- which had concluded in its early decisions that devices operating at very low emission levels would not cause interference and thus would not be interstate communications requiring individual licensing under Section 301 -- no longer has a statutory basis upon which to allow unlicensed operation. After Section 301 was amended in 1982 to clarify that the Commission's authority also covers intrastate communications, the Commission has continued to rely on the harmful interference criteria as the basis for allowing unlicensed operations under Part 15, consistent with reading Section 301's reference to "apparatus for the transmission of energy" not to include devices that have no such interference potential.¹⁸⁸ We hereby explicitly adopt that construction of Section 301.

73. Various amendments to the Communications Act demonstrate that Congress has been well aware that the Commission permits users to operate approved unlicensed devices without a formal "license," but has not disapproved that practice. Just the opposite. For example, in 1992, when Congress amended Section 302 to add subsection (d)(1), it expressly acknowledged the Commission's Part 15 unlicensed operations within the statutory scheme. This subsection states, in pertinent part, that "the Commission shall prescribe and make effective regulations denying equipment authorization (under part 15 of title 47, Code of Federal Regulations, or any other part of that title) for [certain] scanning receiver[s]."¹⁸⁹ Scanning receivers are unlicensed devices, and Congress wanted to ensure that they would not receive transmissions in frequencies allocated to the cellular radio service, which is a licensed service and entitled to protection under the Act.¹⁹⁰

74. As a further example of Congress's acknowledgment of the Commission's unlicensed regulatory regime, in 1996, Congress amended Section 332 of the Act to recognize State and local authority over the placement and construction of certain wireless facilities, including "unlicensed wireless service." Section 332(c)(7)(C)(iii) defines "unlicensed wireless service" as "the offering of telecommunications services using duly authorized devices which do not require individual licenses."¹⁹¹ Reference to these types of devices includes those operating under Part 15, which are "duly authorized"

(...continued from previous page)

would be infeasible and much more burdensome to the public with the Part 15 approach of technical limits and a non-interference requirement).

¹⁸⁸ In the matter of Modification of Parts 2 and 15 of the Commission's Rules for unlicensed devices and equipment approval, ET Docket No. 03-201, Report and Order, FCC 04-165 (July 12, 2004); In The Matter Of Amendment Of Parts 2, 15, 18 And Other Parts Of The Commission's Rules To Simplify And Streamline The Equipment Authorization Process For Radio Frequency Equipment, ET 97-94, Report and Order, FCC 97-84, 12 FCC Rcd. 8743 (Mar 27, 1997); Amendment of Part 2 of the Rules to simplify the equipment authorization procedures, Gen. Docket No. 82-242, Report and Order, FCC 83-3, 48 FR 3614-01 (Jan. 26, 1983).

¹⁸⁹ 47 U.S.C. § 302(d)(1).

¹⁹⁰ House Report for Federal Communications Commission Authorization Act Of 1991, H.R. REP. 102-207, 31 (Sep. 17, 1991) (reporting on Pub.L. 102-556, Title IV, § 403(a)). Indeed, one of the primary reasons Congress added Section 302 to the Communications Act in 1968 was to address interference concerns by strengthening the Commission's power to impose limits on the manufacture of unlicensed Part 15 devices, not by resorting to a formal licensing process to control the interference potential of such devices. Thus, Congress recognized that compliance by manufacturers and others with the Commission's technical rules for unlicensed devices is critical. See S. Rep. No. 1276, 90th Cong., 2d Sess. 1968, 1968 U.S.C.C.A.N. 2486 (1968 Senate Report). As a prominent example of the seriousness of RFI involving unlicensed devices and the need for additional statutory authority for the Commission to strengthen this regulatory approach, the Report cited interference caused to air-safety-related emergency communications frequencies and homer frequencies at a California facility by 58 garage door openers, which were then, as well as now, unlicensed devices subject to technical standards in Part 15 of our rules. Congress discussed the need for statutory change in the legislative history to properly address the increasing popularity of such Part 15 regulated devices as garage door openers. *Id.* at 2488.

¹⁹¹ 47 U.S.C. § 332(c)(7)(C)(iii).

pursuant to the Commission's equipment approval program. Similarly, in Section 3002(c) of the Balanced Budget Act of 1997, which directs the Commission to make additional spectrum available by auction, Congress acknowledged the Commission's unlicensed regulatory regime by expressly protecting those frequency bands that the Commission had already authorized for unlicensed use pursuant to Part 15.¹⁹² Finally, in enacting the Electronic Communications Privacy Act of 1986, Congress noted in the legislative record that cordless telephones "are regulated under Part 15, Subpart E of the rules of the Federal Communications Commission (FCC), and are not licensed."¹⁹³

75. We acknowledge that there is a gray area between those "unlicensed" devices that transmit energy but are clearly beyond any reasonable application of Section 301's licensing requirement¹⁹⁴ and those operations that are clearly subject to Section 301. As explained above, we do not believe it necessary to subject all devices in the gray area to the licensing requirements of Section 301. In the alternative, however, our Part 15 requirements provide a sufficient degree of regulatory oversight, individualized review and approval to constitute a "licensing" process that satisfies Section 301 requirements. While we do not apply the term "license" to the Part 15 approvals that are required to manufacture and distribute Part 15 devices, such approvals (e.g., certifications for intentional radiators) constitute agency authorization for the manufacture, distribution and use of devices that have passed individualized requirements. As such, there is little to distinguish in a practical or legal sense Part 15 approvals of devices from the more overt Section 301 "licenses."

76. Section 301 does not limit the types of licenses that the Commission may grant, and the Commission has exercised discretion in developing a diverse regulatory scheme. Section 3 of the Act defines "station license," "radio station license," or "license" broadly to mean "that instrument of authorization required by this Act or the rules and regulations of the Commission made pursuant to this Act, for the use or operation of apparatus for the transmission of energy, or communications, or signals by radio by whatever name the instrument may be designated by the Commission."¹⁹⁵ The Commission's licensing regime includes, in addition to "license by rule" and site-specific licensing, blanket and wide-area licensing schemes. The typical blanket or wide-area licensing scheme allows individual customers/users to operate within a network without benefit of individual licenses, and the network operator is the sole licensee, as is done, for example, in the cellular wireless service. Because the network operator can control system design and access, and because the Commission has maintained through an individualized approval process the ability to control the use of spectrum, individual users' rights can be identified and interference between users can be avoided; thus, these licensing schemes are a reasonable exercise of the Commission's authority under Sections 4(i), 303(f) and 303(r) of the Act. Similarly, while the Commission does not inspect and test each individual Part 15 device, the Commission's review of a representative device for approval before it can be used is sufficiently individualized to cover all identical devices. Thus, unlicensed devices under Part 15 of the rules may not be operated or marketed without prior Commission authorization (certification, declaration of conformity or verification) to ensure that they operate consistent with the Part 15 technical rules, unless expressly exempted.¹⁹⁶

¹⁹² Balanced Budget Act of 1997, P.L. 105-33 Section 3002(c)(1)(C)(v), 11 Stat. 261 (1997). More specifically, Congress excluded these bands from the Section 3002(c) auction requirement, to the extent that an auctioned service would interfere with the operation of Part 15 devices there. *Id.*

¹⁹³ P.L. 99-508, H. Rep. 99-647, 99th Cong., 2d Sess. at 33 (June 19, 1986).

¹⁹⁴ This category is comprised of pervasively used devices whose energy output has no significant effect on the communications use of the spectrum (e.g., automobile ignitions).

¹⁹⁵ 47 U.S.C. § 3(42). Likewise, the Administrative Procedures Act defines license as "the whole or a part of an agency permit, certificate, approval, registration, charter, membership, statutory exemption or other form of permission." 5 U.S.C. § 551(8).

¹⁹⁶ 47 C.F.R. § 15.1.

77. Moreover, the individualized nature of the Part 15 approval process distinguishes this type of review from the “license by rule” approach used for Section 307(e) services that are exempted from Section 301’s licensing requirement. Thus, we disagree with Cingular that Section 307(e) is inconsistent with our reading of Section 301. Under the licensing exemptions of Section 307(e), certain higher power communications services may be provided without any Commission review of the provider or of the specific operation that the provider intends to provide. Rather, the Commission adopts a set of rules that prescribe parameters of operation, and anyone may operate the service in any manner within those parameters. In contrast, to rely on a Part 15 approval, a Part 15 device cannot differ in any significant regard from the exact device that has garnered Part 15 approval.¹⁹⁷

78. Cingular has argued throughout this proceeding that UWB transmission systems should be permitted solely on a formal, licensed basis, and now in its second petition for reconsideration attacks our statutory authority to adopt rules permitting UWB or any other similar operation on a Part 15, “unlicensed” basis.¹⁹⁸ We discussed at length in the *1st R&O* the merits of permitting UWB operations on a licensed or unlicensed basis, and have otherwise responded to the merits of Cingular’s various arguments on different aspects of the unlicensed rules adopted.¹⁹⁹ We therefore deny the Petitioner’s request for reconsideration and affirm our decisions in the *1st R&O* and *MO&O*, respectively.

3. Harmful interference to cellular, PCS and E911 operations

79. Cingular claims that the Commission’s authorization of UWB devices was performed without an adequate record to demonstrate that harmful interference would not be caused to cellular, PCS and E911 operations. This claim addresses decisions made in the *1st R&O* and could be considered an untimely filed petition. Cingular also addresses arguments that were raised by Cingular, Qualcomm and Sprint in their petitions for reconsideration of the *1st R&O* and thoroughly discussed in the *MO&O*.²⁰⁰ Cingular presents no new information or data and this portion of its petition could be dismissed as repetitious. Cingular raises only one issue that addresses the *MO&O* stating that the Commission made contradictory statements regarding the record.

80. With regard to contradictory statements regarding the record, Cingular indicates that it requested reconsideration of the *1st R&O* because the Commission failed to consider the interference impact to cellular, TDMA and GSM systems.²⁰¹ Cingular states that the Commission rejected its request because no data was provided. Cingular adds that the Commission, later in the *MO&O*, refused to reconsider its standards pending the completion of additional testing stating that there had been

¹⁹⁷ Moreover, to the extent that Part 15 devices fall outside of the Section 301 licensing requirement (a proposition that is particularly apparent for such energy-transmitting apparatuses as automobile ignitions and induction furnaces), we note another reason why the Commission’s unlicensed regime of equipment authorization is consistent with Congress’s creation of the Section 307(e) individual license exceptions: the Section 307(e) services could never have been authorized under Part 15, because they use power levels that are too high. Thus, Section 301 would require them to be licensed, but for Congress’s decision to exempt them.

¹⁹⁸ See, e.g., Cingular comments of 12/5/01 at pg. 4, 11/13/01 at pg. 3, 10/12/01 at pg. 3-4, 8/20/01 at pg. 3, 8/20/01 at pg. 5, 2/23/01 at pg. 2-3. See, also, Alloy LLC (Cingular’s former name) comments of 2/23/00 at pg. i, 6-8 and 17 (urging the Commission to adopt rules permitting UWB on a licensed basis and arguing against allowing unlicensed UWB operation).

¹⁹⁹ See *1st R&O*, *supra*, at para. 12-19; see, also, *MO&O*, *supra*, at para. 95 (discussing the Commission’s conclusion that the registered coordination of UWB imaging devices, as requested by Cingular in its 6/17/02 Petition for Reconsideration of the *1st R&O*, was not justified as there was no reason to believe that the devices, operating in compliance with the rules, would cause interference).

²⁰⁰ See *MO&O*, *supra*, at para. 55-97.

²⁰¹ Cingular petition of 5/23/03 at pg. 22-23.

considerable analysis on every possible aspect of interference. However, Cingular argues that there is no record support for this statement by the Commission. Cingular argues that if no data had been provided regarding cellular interference, the Commission could not have considered every possible aspect. To demonstrate that there was no discussion in the *Ist R&O* regarding interference to cellular systems, Cingular asserts that the term "cellular" does not appear in the *Ist R&O*.²⁰² Cingular believes that this contradiction constitutes unreasoned decision making. Cingular also states that it had provided data regarding signal and interference levels for TDMA cellular and for TDMA and GSM PCS but that the Commission ignored all of this evidence.²⁰³ Cingular argues that the Commission, in the *MO&O*, incorrectly stated that Cingular had not provided any additional information on other types of modulation techniques that could be employed for cellular or for PCS and asserts that this statement acknowledges that the Commission failed to consider record evidence supplied by Cingular. Based on this, Cingular claims that the Commission's decision is subject to reversal.²⁰⁴

81. Cingular mischaracterizes the actions taken by the Commission in its *Ist R&O* and its *MO&O* and presents several misstatements of fact. For example, Cingular claims that the *Ist R&O* contained no discussion regarding the UWB interference potential to cellular applications and that the Commission dismissed or ignored all data. However, the *Ist R&O* does indeed contain a discussion of cellular interference susceptibility at paragraph 192.²⁰⁵ Cingular also misquotes the statement from the Commission to reach the conclusions in its current petition. In its *MO&O*, the Commission stated that "[w]hile Cingular objects to our not providing similar analyses for TDMA and GSM modulation types, we based our analysis on the specifications provided by the proponents. We note that Cingular has not provided any additional information on other types of modulations that could be employed for cellular or for PCS." [emphasis added]²⁰⁶

82. We recognize that Cingular, on October 12, 2001, submitted an *ex parte* letter specifying values for the sensitivity for TDMA cellular and PCS receivers and for GSM PCS receivers.²⁰⁷ In that letter, Cingular also supplies carrier-to-interference specifications for these receivers. It is unclear if these values were based on test data or, as indicated in Cingular's letter, if they only reflect performance specifications. Cingular's reference to measurement data only stated that recent measurements in an urban area showed that signals were at acceptable levels. Cingular added that in cases of severe blockage and/or shadowing that signal levels were as low as the minimum stated sensitivity levels. Cingular did not indicate whether or not operation was possible at these "severe blockage and/or shadowing" levels. Cingular did not supply any data regarding co-cell and adjacent-cell noise levels, receiver processing gains, or other parameters which would enable a complete interference analysis. Cingular simply claimed that its systems operated at the minimum specified receiver sensitivities.

83. The Commission concentrated its discussion on interference potentials to CDMA PCS operations since this constituted the majority of analyses and data submitted in this proceeding and there appeared to be a lack of actual test data regarding TDMA and GSM systems. While the discussion on the impact to cellular operations is considerably less than the amount of discussion on the potential impact to PCS operations, it must be recognized that, with limited exceptions, the Commission did not authorize

²⁰² Cingular petition of 5/23/03 at pg. 16-17.

²⁰³ *Id.* at pg. 15, 16-17.

²⁰⁴ *Id.* at pg. 18.

²⁰⁵ Contrary to Cingular's claim, cellular systems also are addressed in paragraphs 200, 233, and 271 of the *Ist R&O*.

²⁰⁶ *MO&O*, *supra*, at para. 86.

²⁰⁷ See *ex parte* letter of October 12, 2001, from Jim Bugel of Cingular to Julius Knapp, Deputy Chief of the Commission's Office of Engineering and Technology.

UWB devices to operate in the cellular bands or in the PCS frequency bands.²⁰⁸ Consumer UWB devices are not permitted to operate below 3100 MHz. Thus, consumer UWB devices are so far removed from the spectrum used for cellular applications that it is unlikely that measurable emissions from the fundamental component will even appear the cellular bands. Rather, it is likely that any emissions appearing within the cellular bands will be random spurious emissions from associated digital circuitry and that any potential impact to cellular operations will be less than that caused by existing digital devices. Further, the CDMA PCS systems, according to information submitted by Sprint and Qualcomm, appeared to be at least as sensitive to harmful interference as the receivers specified by Cingular. Thus, the Commission concentrated its analysis on the test data it had on hand. This was a reasonable approach and produced interference analysis results that similarly apply to TDMA and GSM systems. When Cingular requested reconsideration of the decision in the *Ist R&O*, it supplied no additional data that could be used by the Commission to come to a different conclusion. Since, as stated in the *MO&O*, Cingular did not file any additional data in this proceeding, no further analysis of cellular, TDMA or GSM systems was possible. Accordingly, there is no contradiction in the statements in the *MO&O* that are cited by Cingular. The Commission did consider the interference aspects to all types of cellular and PCS operations using the best data it had before it.

84. There was only one change in the *MO&O* that affected the level of emissions appearing within the PCS frequency bands and no changes that affected the levels of emissions appearing within the cellular frequency bands. Prior to the *MO&O*, the equivalent isotropically radiated power (EIRP) limit produced in the PCS bands by through-wall imaging systems operating above 1990 MHz was limited to -51.3 dBm/MHz. The Commission, in the *MO&O*, increased this emission limit to -41.3 dBm and explained why such an increase would not result in harmful interference.²⁰⁹ However, the petition from Cingular does not address, much less object to, any of the rule changes implemented in the *MO&O*. Instead, Cingular continues to argue against actions taken by the Commission in the *Ist R&O*. Cingular has provided no new information, presenting the same arguments it employed in its petition for reconsideration of the *Ist R&O*. Those arguments already were addressed in the *MO&O*. As noted by XSI, Cingular states repeatedly that the Commission “rejected” or “dismissed” or “ignored” or “disregarded” or “discounted” arguments Cingular (and others) placed in the record.²¹⁰ However, a reading of the *Ist R&O* and the *MO&O* clearly shows that the Commission considered the views and data submitted by the commenting parties. The Commission simply disagreed with some of these submissions and explained the basis for its disagreement within the *Ist R&O* and again in the *MO&O* in response to the first petitions for reconsideration. The Commission fully considered the comments, test data, interference analyses and other material filed in this proceeding. Full opportunity for all affected parties to comment has been afforded.

85. Petitions for reconsideration are not granted for the purpose of altering our basic findings or debating matters that have been fully considered and substantively settled.²¹¹ Absent new facts and information, we find Cingular’s arguments about the interference potential of UWB devices to be repetitive and without merit. Accordingly, the portion of Cingular’s petition for reconsideration claiming

²⁰⁸ GPRs and technically similar wall-imaging systems are permitted to operate in the cellular and PCS frequency bands. As discussed in the *Ist R&O*, these devices do not present a threat of harmful interference to cellular or to PCS operations. See *Ist R&O*, *supra*, at para. 185, 189 and 192 as examples.

²⁰⁹ *MO&O*, *supra*, at para. 12-16. While the analysis described in these paragraphs is directed towards GPS reception, it is equally applicable to PCS operation.

²¹⁰ XSI comments of 9/4/03 at pg. 4.

²¹¹ See, e.g., Regulatory Policy Regarding the Direct Broadcast Satellite Service, *Memorandum Opinion and Order*, 94 FCC 2d 741, 747-748 (1983) (citing, e.g., *WWIZ, Inc.*, 37 FCC 685, 686 (1964), *aff’d sub nom., Lorain Journal Co. v FCC*, 351 F 2d 824 (D.C. Cir. 1965), cert denied, 383 U.S. 967 (1966), *Florida Gulfcoast Broadcasters, Inc., Broadcasting*, 4 Rad Reg 2d (P&F) 503 (1965)).

that the Commission's authorization of UWB devices was performed without an adequate record to demonstrate that harmful interference would not be caused to cellular, PCS and E911 operations, including Cingular's claim that the Commission made contradictory statements in its *MO&O* regarding the record in this proceeding, is denied.

4. Rights of incumbent cellular and PCS licensees

86. Cingular claims that the *MO&O* fails to adequately protect the rights of incumbent cellular and PCS licensees by undermining the exclusivity rights of the licensees, by failing to include these licensees in a coordination process with UWB operators, and by failing to lower the emission limits in the PCS and cellular frequency bands for indoor UWB devices.²¹² These claims by Cingular were raised in its petition for reconsideration of the *1st R&O* and were denied by the Commission in its *MO&O*.²¹³ Cingular presents no new evidence or information to support its claims. Thus, Cingular's claims amount to a petition for reconsideration of the *1st R&O* and should be considered an untimely filed petition that can be dismissed as repetitious.

87. Cingular also argues that the Commission, in the *MO&O*, mischaracterized a recent court opinion, *AT&T Wireless v. FCC*,²¹⁴ when it stated that the Court "affirmed the Commission's decision that even an exclusive licensee cannot object to secondary use of its spectrum as long as no harmful interference results."²¹⁵ Cingular argues that there was no affirmation, as such, but instead that the court was remanding certain issues to the Commission. Cingular also contends that the court never endorsed all secondary spectrum use in the absence of harmful interference asserting that the premise of the case was that there would be no degradation of service. Cingular adds that the court did not endorse secondary users causing objectionable interference and argues that the court's decision was specifically subject to the harmful interference issue being resolved in the remand.²¹⁶

88. In its decision in the *AT&T Wireless v. FCC* case, the Court, *inter alia*, dismissed various claims by the petitioners,²¹⁷ but found that in rejecting a report advocating a specific interference criterion, the Commission was unclear as to its choice of the appropriate interference threshold supporting its conclusion that AirCell's operations would not cause harmful interference to terrestrial cellular systems. Specifically, where the Commission concluded that the report had relied on "unrealistic assumptions, including the use of an unrealistically low interference threshold," the court remanded for the Commission to clarify the justification for its view that use of the petitioner's proposed threshold of minus 124 dBm was too conservative and that an interference threshold of minus 117 dBm was more realistic.²¹⁸ The court notes, however, that it remanded so that the Commission could explain why it considered one interference threshold preferable to another, but not to defend the threshold ultimately

²¹² Cingular petition of 5/23/03 at pg. 23-25.

²¹³ *MO&O*, *supra*, at para. 56, 74, 86, and 95.

²¹⁴ *AT&T Wireless Services, Inc. v. F.C.C.*, 270 F.3d 959, 348 U.S.App.D.C. 135 (D.C.Cir. Nov 09, 2001) ("*AirCell I*") (NO. 00-1304), *on Remand to*, Aircell, Inc., 2003 WL 261920, 18 F.C.C.R. 1926, 18 FCC Rcd. 1926 (F.C.C. Feb 10, 2003) ("*AirCell Remand Order*"), *petition for review denied by*, *AT&T Wireless Services, Inc. v. F.C.C.*, 365 F.3d 1095 (D.C.Cir. May 04, 2004) ("*AirCell II*").

²¹⁵ Cingular petition of 5/23/03 at pg. 23; *MO&O*, *supra*, at para. 74 and at footnote 188.

²¹⁶ Cingular petition of 5/23/03 at pg. 23.

²¹⁷ The Court found that the Commission adequately explained why it rejected the July 11, 1997, Texas-Oklahoma test data and the September 22, 1998, Florida test data upon which petitioners relied. See [*AirCell I*] at 968-69.

²¹⁸ See [*AirCell I* at 968-69] *id.*

selected.²¹⁹

89. We find that Cingular's objection is without merit. The Commission correctly noted in the *MO&O* and the *AirCell Remand Order* that the court had remanded the Commission to explain the selection of the interference criterion, and that the court had affirmed the Commission's finding that absent harmful interference the petitioner's rights as a licensee were not changed by the AirCell waiver.²²⁰ On remand, the Commission found no interference to the wireless carrier's operations, which is the case here.²²¹ The court also found that Commission rules proscribe only harmful interference within a given carrier's cellular geographic service area ("CGSA"), and that AirCell's new system did not infringe upon petitioners' rights as exclusive licensees to be protected from harmful interference.²²² The court specifically referred to "harmful interference" and not degradation of service or objectionable interference as cited by Cingular.

90. With the exception of GPRs and wall imaging systems, UWB devices do not operate within the PCS or cellular bands although they may produce emissions within these bands. Cingular's claim of exclusivity would prohibit the Commission from allowing any emissions to fall within a licensee's cellular or PCS bands, even if those emissions are sufficiently attenuated to not cause harmful interference to the operation of the cellular or PCS systems. Thus, Cingular's interpretation of the exclusivity provided to a cellular or PCS license also would preclude the Commission from licensing additional PCS or cellular stations, as well as public safety and other radio operations, in different frequency bands since those stations produce emissions outside of their licensed band of operation.²²³ Clearly, this is not the case. We also note that the operation of unlicensed devices in the PCS and cellular bands has been permitted under Part 15 at higher emission levels than those produced by UWB devices since before the allocation of the cellular and PCS services.²²⁴ We disagree with Cingular's concern about the Commission's characterization of the Court's opinion in *AT&T Wireless v. FCC*. The Court affirmed, in the AirCell waiver proceeding, that an exclusive licensee could not object to the Commission's policy decision to permit secondary use rights where such secondary use did not cause harmful interference.²²⁵

91. The Commission has already fully considered the issues presented by Cingular and the comments. Cingular has provided no new information but, with one exception, continues to present the

²¹⁹ See [*AirCell II*] at 1102.

²²⁰ *MO&O*, *supra*, at footnote 188.

²²¹ The Commission's review on remand of the July 10 test flight data showed that AirCell's mean signal strength exceeded -117 dBm only on one of the 24 test flights, and then only by .62 decibels, a trivial amount. It concluded, therefore, that AirCell was unlikely to cause harmful interference. See [*AirCell II*] at 1102; see also [*AirCell Remand Order*] at 1937.

²²² See [*AirCell I*] at 964. The Court also stated that "absent harmful interference, AirCell's new system does not trammel upon petitioners' rights as licensees." *Id.*

²²³ A radio frequency device can generate unwanted emissions that may appear in any part of the radio spectrum.

²²⁴ 47 C.F.R. § 15.209 of the current rules permits operation within the PCS bands at a higher level than that allowed from UWB devices and within the cellular bands at the same level as that allowed from UWB devices. 47 C.F.R. § 15.231 allows operation within the PCS and cellular frequency bands at considerably higher emission levels than those produced by UWB devices. Prior to June 23, 1989, 47 C.F.R. §§ 15.120, 15.122, 15.181-15.187, and 15.201-15.215 permitted unlicensed operation within the PCS and cellular bands at the higher power levels currently permitted under 47 C.F.R. § 15.231.

²²⁵ The term "exclusivity" as used in the case refers to "geographic exclusivity and protection from interference." See [*AirCell*] at 963-64.

same arguments it employed in its petition for reconsideration of the *Ist* R&O that were addressed in the *MO&O*. The statement in the *MO&O* addressing XSI's comment that the court had affirmed a decision²²⁶ does not constitute reversible error especially since the Commission correctly referenced this case as a remand and since the reference to this case does not constitute the Commission's sole argument for the denial of Cingular's claim. Full opportunity for all affected parties to comment has been afforded and we have fully considered all relevant matters in the record. Absent new facts and information, we find Cingular's arguments about protecting the rights of incumbent cellular and PCS licensees to be repetitive and without merit. According, this portion of Cingular's petition for reconsideration is denied.

B. Interference to C-Band Fixed Satellite Service

92. Background. On June 17, 2002, SIA filed a Petition for Reconsideration of the *Ist* R&O. In this petition, SIA argued that the Commission's analysis in the *Ist* R&O regarding the interference potential to FSS operation in the 3.7-4.2 GHz band was inconsistent because it developed a protection criteria based on indoor UWB operation but also permitted these devices to operate outdoors. SIA argued that the Commission relied on a building to serve as a buffer between the UWB emitter and the FSS earth station but that this attenuation can not be assumed for outdoor UWB devices. It requested that emissions from outdoor UWB devices be reduced in the FSS band. SIA also argued that the Commission did not meaningfully address the minimum separation distances specified in the NTIA report for protecting FSS stations from UWB emissions, indicating that the required separation distances extended up to tens of kilometers. On January 10, 2003, SIA submitted a technical analysis demonstrating that the peak level emissions from a single UWB device could cause harmful interference to FSS reception at a distance of up to 4.4 km. The Commission denied the SIA petition, along with the later technical analysis, adding that appropriate action would be taken to protect FSS stations should tests or other sources provide any indication that its standards are not adequate to protect the authorized services from harmful interference.²²⁷

93. On May 22, 2003, SIA filed a Petition for Reconsideration of the *MO&O*. SIA argues that the 0 dB interference-to-noise ratio (I/N) used by the Commission in its analysis in the *Ist* R&O will result in FSS stations receiving harmful interference.²²⁸ SIA requests that an I/N of -10 dB be applied. SIA also argues that the assumptions used in its technical arguments contained in its technical analysis of January 10, 2003, are appropriate and are necessary to evaluate the UWB interference to FSS receivers.²²⁹ Specifically, SIA states that the Commission was in error in characterizing its analysis as being overly conservative, citing five areas that it believes were incorrectly addressed by the Commission: 1) the low elevation angles of the FSS antenna; 2) the presence of natural and man made structures resulting in attenuation of the UWB emissions; 3) the probability that UWB devices would emit at the maximum peak emission level; 4) the low relative heights of the FSS and UWB antennas; and 5) the Commission's denial in the *Ist* R&O of the use of a -10 dB I/N. SIA states that the Commission questioned that FSS receivers will operate with antennas directed low towards the horizon, indicating that such low elevation angles are commonplace and necessary. SIA also states that it did not assume that there would be no intervening objects in the calculated separation distances between the UWB emitter and the FSS receiving antenna but only demonstrated that a UWB device that was visible to an FSS receiving antenna and within 4.4 km would result in interference. SIA indicates that it assumed that UWB devices may operate at the maximum peak power levels permitted under the rules and that, as omnidirectional devices, would transmit their signals in the direction of the FSS receiving antenna. SIA adds that if the Commission is

²²⁶ *MO&O, supra*, at para. 74.

²²⁷ *MO&O, supra*, at para. 124-131.

²²⁸ SIA petition of 5/22/03 at pg. 3.

²²⁹ *Id.* at pg. 3-8.

confident that outdoor UWB devices will not radiate at the peak limit then it should lower the limit.²³⁰ SIA also states that the relative heights of the UWB and FSS antenna have a *de minimus* impact on the required separation distances. SIA states that the Commission criticized SIA's reliance on a -10 dB I/N but that SIA can demonstrate a basis for requiring an I/N of -10 to -12.2 dB. Finally, SIA states that FSS antennas can be pointed at buildings and still have ample clearance for line-of-sight satellite reception, arguing that the 10 dB isolation claimed by XSI due to offset from the satellite antenna does not exist.²³¹ SIA provides an attached engineering statement.

94. Comments/Discussion. XSI states that the SIA petition offers no facts or laws that were not previously available, adding that the Commission has already dealt with all of the arguments raised by SIA, including the I/N, peak versus average levels, and earth station geometries.²³² XSI adds that the petition should be dismissed as repetitious since the bulk of the petition does nothing more than dispute the findings in the *MO&O* without adding newly available fact or analysis. We concur with this assessment. The Commission did not make any changes in the *MO&O* that affect the levels of the emissions that may appear in the FSS frequency bands. Rather, SIA continues to dispute the issue of a relative I/N ratio that was addressed in the *Ist R&O*. The time is long past for filing a petition for reconsideration of that decision. SIA also disputes the Commission's statement in the *MO&O* that the interference scenario employed by SIA in its technical analysis is overly conservative. SIA continues to argue the unlikely scenario that UWB emissions are subject to a propagation loss that is applicable only when there is a clear line-of-sight between the UWB emitter and the FSS receiving antenna,²³³ that the UWB devices will operate at relatively low pulse repetition frequencies producing high level peak emissions, and that the FSS receiver will respond fully to the peak level emissions from the UWB emitter. SIA does not address the Commission's statement that low elevation FSS systems generally are mounted in secured areas that are not readily accessible to the public nor has it ever provided any evidence that FSS receivers will respond fully to the peak emission levels from UWB devices. Indeed, SIA presents no new information to substantiate its claims but only continues to argue against the Commission's decision. Accordingly, SIA's current Petition for Reconsideration can be considered repetitious of its earlier Petition for Reconsideration of the *Ist R&O* and this petition therefore is dismissed.

95. Alion analysis. Since the filing of the SIA Petition for Reconsideration, the Coalition of C-Band Constituents ("Coalition") contracted with Alion Science and Technology ("Alion") to determine what, if any, interference potential exists to FSS reception from UWB operation. A test report on this matter was submitted to the Commission on February 11, 2004.²³⁴ The Alion study concludes that FSS receivers will experience "complete reception failure at currently regulated UWB power levels assuming emitter densities currently found in the environment of common wireless-based consumer units."²³⁵

²³⁰ *Id.* at pg. 8-9.

²³¹ *Id.* at pg. 3 and 9.

²³² XSI comments of 9/4/03 at pg. 1 and 2-4.

²³³ SIA based the propagation attenuation on the square of the inverse distance, *i.e.*, the propagation loss in decibels is equal to $20 \log (DF) - 147.6$ where D is the distance in meters and F is the frequency in Hertz. At 4 GHz, this formula becomes $20 \log (D) + 44.5$ dB.

²³⁴ *Evaluation of UWB and Lower Adjacent Band Interference to C-Band Earth Station Receivers*, Alion Science and Technology, February 11, 2004. ("Alion report") In the *MO&O*, the Commission stated that it would take appropriate action to protect the authorized services if tests or other sources provide any indication that its standards are not adequate. See *MO&O, supra*, at para. 131. For this reason, we are accepting this report as a late filing in this proceeding. Written *ex parte* comments responding to this study were filed on April 9, 2004, by Motorola, Inc., on April 12, 2004, by the Multiband OFDM Alliance, and on June 4, 2004, by the Coalition of C-Band Constituents.

²³⁵ Alion report at pg. 6-7.

Based on this report, the Coalition, in its cover letter of February 18, 2004, concludes that the Commission must reduce the level of emissions permitted in the 3700-4200 MHz band by 21 dB.

96. The Alion study is based on multiple worst-case assumptions, most of which simply are not realistic. For example, this study is founded on the premise that a large number of UWB devices will be near the FSS receiver and will contribute significantly to the aggregate interference level. Specifically, the study assumes that ninety percent of the UWB devices distributed within 1000 meters of the FSS station, 70 percent between one and two km, 50 percent within two and three km, etc. have a direct line-of-sight propagation path into the FSS receive antenna without attenuation from any intervening objects.²³⁶ In addition, it is assumed that UWB transmitters may be located as close as 30 meters to the FSS antenna, that all UWB emitters within a 5 km radius are pointed directly at the FSS antenna, and that all UWB emitters operate at a 100 % activity factor. Further, the Alion analysis assumes that every UWB device operating within 5 km of the FSS station produces the maximum permissible power spectral density (PSD) level within the pass band of the FSS receiver. The Coalition has further exacerbated the worst-case results from the Alion study by applying unsupported and unreasonable projections with respect to UWB device proliferation. The Coalition assumes that UWB devices will replace all existing Part 15 cordless telephones, wireless security applications, and wireless data communications and will be used for communications within and between vehicles, resulting in an estimated 64 UWB devices per acre or 1.24 million UWB devices, all operating continuously, within 5 km of an FSS receiver.²³⁷

97. The current UWB regulations severely restrict what types of devices may be operated outdoors. Outdoor usage is limited to hand-held, very short range, peer-to-peer operations that likely will be of extremely short duration. This hand-held restriction precludes the mounting of UWB devices in transportation vehicles.²³⁸ Because of these restrictions, only a small percentage of UWB devices, likely much less than 5 percent, will be operated outdoors and these will have extremely low activity factors. In addition, the hand-held requirement essentially ensures that a large percentage of UWB units operated outdoors will be subject to attenuation from head and body shielding from the user.²³⁹ Further, outdoor UWB devices would be operated close to the ground and the resulting multipath interactions will result in the emissions from these devices attenuating at a much faster rate than was calculated by Alion using free space propagation. All non-hand-held UWB devices must be located indoors where their emissions would be subject to an average 12 dB attenuation from shielding provided by the building.²⁴⁰ The emissions from indoor UWB devices also would be subject to a propagation attenuation factor much greater than the free space model.²⁴¹ Several ranges of activity factors have been hypothesized for indoor

²³⁶ Under this condition, Alion calculated the path loss using free space propagation, i.e., based on the square of the inverse of the distance, where the propagation loss in dB is equal to $20 \log (DF) - 147.6$ where D is the distance in meters and F is the frequency in Hertz. At $F = 4$ GHz, this formula becomes $20 \log (D) + 44.5$ dB.

²³⁷ On March 5, 2004, the Coalition submitted a letter to the Commission stating that it now believes that a higher density and a higher UWB operating duty cycle should be applied, based on the number of USB computer ports available within the U.S. and its speculation that UWB devices would be attached to these ports.

²³⁸ The limited transmission range also would effectively preclude the use of hand-held UWB devices for vehicle-to-vehicle communications.

²³⁹ While no data is available for the attenuation caused to outdoor UWB devices due to hand-held operation, Sprint found that PCS handsets operating at 1900 MHz suffered a 12 dB to 15 dB attenuation due to "head loss," i.e., signal blockage by the user. See Sprint comments of 9/12/00 at Attachment 2, pg. 2-3. It is expected that the attenuation from the hand and body shielding at the 4 GHz FSS frequency would be at least as high, if not more, as that in the 1.9 GHz PCS band.

²⁴⁰ The average building attenuation at 4 GHz is 12 dB, as determined by NTIA. See NTIA Special Publication 01-43, *Assessment of Compatibility between Ultrawideband Devices and Selected Federal Systems*, January 2001, at pg. 5-30 to 5.31.

UWB applications and these are well below the 100 percent level employed in the Alion study.

98. In addition to the above, UWB devices separated from the FSS site by any appreciable distance, regardless of whether they are operated outdoors or indoors, are likely to encounter multiple intervening objects that provide considerable additional attenuation to the emissions.²⁴² Because FSS receive sites are outdoors, and are usually located to avoid radio noise from other sources, it is highly unlikely that any UWB devices will be operated within 30 meters unless those devices are operated by FSS personnel. Further, we anticipate that many UWB transmitters will employ directional patch antennas and would not necessarily direct their signals toward the FSS site. In addition, not all UWB devices will operate with their emissions centered at 4 GHz nor will all UWB devices produce spectral lines that appear in the passband of an FSS receiver. It is expected that UWB operations, along with their associated maximum power density levels, will be distributed over several portions of the entire authorized frequency band (3.1-10.6 GHz) and not concentrated only within a single 500 MHz (3.7-4.2 GHz) sub-band. Finally, we disagree that UWB devices will operate at the density levels speculated by the Coalition. Because our current standards effectively limit UWB to a transmission range of only 10 meters, UWB technology is not expected to be used as cordless telephones or security systems. We expect that most consumer devices will continue to operate using technologies that can operate in other frequency bands available under Part 15.

99. The Commission was able to duplicate the Alion study, obtaining similar results when using the same assumptions Alion employed. The Commission then recalculated this analysis based on more realistic operating conditions, assuming that many UWB devices would be located indoors where the building would provide additional path loss to the outdoor satellite receive antennas, and obtained results that more than offset the 21 dB of attenuation requested by the Coalition.²⁴³ The Commission also found that the large majority of the interference potential is caused by the UWB device that is near the main beam of the FSS receiving station. The aggregate contribution from the remainder of the assumed UWB devices is negligible. As evaluated by Alion, the calculation for increasing the aggregate contribution from 1000 continuously operating UWB transmitters to 1.24 million transmitters accounts for 31 dB of the 21 dB additional attenuation requested by the Coalition. Based on these two offsets to the Coalition's requested protection criteria, we find no justification to reduce the UWB emission levels in the FSS frequency band. However, we will continue to monitor this situation and will take whatever appropriate action is necessary to ensure that UWB operation does not result in harmful interference to FSS receivers. If a Part 15 device causes interference it is required to remedy the interference or to cease operation.²⁴⁴ The remedy could be as simple as relocating the UWB device away from a window. In any

(...continued from previous page)

²⁴¹ Propagation loss, after accounting for the 12 dB building attenuation, should approach inverse distance to the fourth or, with $F = 4$ GHz, a loss of $40 \log(D) + 44.5$ dB.

²⁴² At a frequency of 1.5 GHz, NTIA found that "aggregate interference from uniformly distributed emitters at distances of less than 1 km would decrease by at least 15 dB in suburban areas and 20 dB in urban areas, as compared with a smooth Earth propagation loss" and that emissions from emitters beyond one km were reduced by 30 dB in suburban environments and 40 dB in urban environments, virtually eliminating any aggregate effects from UWB devices beyond 1 km. NTIA added that these signal losses increase at frequencies above 1.5 GHz. See NTIA Special Publication 01-43, *supra*, at pg. 5-28 and 5-29.

²⁴³ The Commission's analysis only varied the percentages of devices that were operated indoors and outdoors along with the application of a 12 dB building attenuation factor for indoor UWB transmitters. If the Commission had assumed even more realistic operating conditions by applying intervening objects and a more reasonable propagation factor to outdoor UWB transmitters, multiple intervening objects to indoor UWB transmitters, the possibility that the UWB emitter and the satellite antenna are not line-of-sight with each other, and an activity factor, the results would have been even lower.

²⁴⁴ 47 C.F.R. § 15.5.

event, the Commission will investigate any interference complaints from UWB devices to the authorized radio services, will take steps to ensure that harmful interference is corrected, and will take whatever enforcement actions may be deemed necessary.

V. ADMINISTRATIVE PROVISIONS

100. Paperwork Reduction Act of 1995 Analysis. This document contains modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under Section 3507(d) of the PRA. OMB, the general public, and other Federal agencies are invited to comment on the new or modified information collection requirements contained in this proceeding.

101. The Commission will send a copy of this Second Report & Order and Second Memorandum Opinion and Order in a report to be sent to Congress and the General Accounting Office pursuant to the Congressional Review Act, *see* 5 U.S.C. 801(a)(1)(A).

102. Final Regulatory Flexibility Certification. The Regulatory Flexibility Act of 1980, as amended (RFA),²⁴⁵ requires that a regulatory flexibility analysis be prepared for notice-and-comment rule making proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."²⁴⁶ The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."²⁴⁷ In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.²⁴⁸ A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).²⁴⁹

103. In this Second Report and Order and Second Memorandum Opinion and Order, we are implementing a change to the rules to facilitate the operation of wideband unlicensed transmitters. We also are responding to two petitions for reconsideration regarding rules that permit the marketing and operation of products incorporating ultra-wideband ("UWB") technology. UWB devices operate by employing very narrow or short duration pulses that result in very large or wideband transmission bandwidths. With appropriate technical standards, UWB devices can operate on spectrum occupied by existing radio services without causing interference, thereby permitting scarce spectrum resources to be used more efficiently. Further, as noted in the text we have continued to apply conservative limits to the standards applicable for UWB operation, until such time as we gain additional experience, to ensure that harmful interference would not be caused to other radio spectrum users. Further, the changes adopted in this proceeding will not affect any party legally manufacturing or marketing UWB devices. Thus, we expect that our actions do not amount to a significant economic impact. Accordingly, we certify that the rules being adopted in this Memorandum Opinion and Order will not have a significant economic impact on a substantial number of small entities.

²⁴⁵ The RFA, *see* 5 U.S.C. § 601 – 612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

²⁴⁶ 5 U.S.C. § 605(b).

²⁴⁷ 5 U.S.C. § 601(6).

²⁴⁸ 5 U.S.C. § 601(3) (incorporating by reference the definition of "small-business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

²⁴⁹ 15 U.S.C. § 632.

104. The Commission will send a copy of the Second Report and Order and Second Memorandum Opinion and Order, including a copy of this Final Regulatory Flexibility Certification, in a report to Congress pursuant to the Congressional Review Act.²⁵⁰ In addition, the Second Report and Order and Second Memorandum Opinion and Order and this final certification will be sent to the Chief Counsel for Advocacy of the SBA, and will be published in the Federal Register.²⁵¹

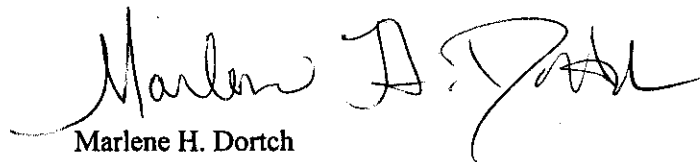
105. Ordering Clauses. IT IS ORDERED that the Petition for Reconsideration from Cingular, Inc. IS DENIED. IT IS ORDERED that the Petition for Reconsideration from Satellite Industry Association IS DISMISSED. IT ALSO IS ORDERED that Part 15 of the Commission's Rules and Regulations IS AMENDED as specified in Appendix A, effective 30 days after publication in the Federal Register. This action is taken pursuant to Sections 4(i), 302, 303(e), 303(f), 303(r), 304 and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 302, 303(e), 303(f), 303(r), 304 and 307.

106. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Second Report and Order and Second Memorandum Opinion and Order, including the Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

107. IT IS FURTHER ORDERED that this proceeding IS TERMINATED.

108. For further information regarding this Second Report and Order and Second Memorandum Opinion and Order, contact John A. Reed, Office of Engineering and Technology, (202) 418-2455, john.reed@fcc.gov.

FEDERAL COMMUNICATIONS COMMISSION


Marlene H. Dortch
Secretary

²⁵⁰ See 5 U.S.C. § 801(a)(1)(A).

²⁵¹ See 5 U.S.C. § 605(b).

Appendix A Changes to the Regulations

Title 47 of the Code of Federal Regulations, Part 15, is amended as follows:

1. The authority citation for Part 15 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302, 303, 304, 307, 336 and 544A.

2. Section 15.35 is amended by revising paragraph (b) to read as follows:

Section 15.35 Measurement detector functions and bandwidths.

* * * * *

(b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, *e.g.*, see §§ 15.250, 15.252, 15.255, and 15.509-15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, *e.g.*, the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

* * * * *

3. Section 15.215 is amended by revising paragraph (c), to read as follows:

Section 15.215 Additional provisions to the general radiated emission limitations.

* * * * *

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

4. A new Section 15.250 is added to read as follows:

Section 15.250 Operation of wideband systems within the band 5925-7250 MHz.

(a) The -10 dB bandwidth of a device operating under the provisions of this section must be contained within the 5925-7250 MHz band under all conditions of operation including the effects from stepped frequency, frequency hopping or other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

(b) The -10 dB bandwidth of the fundamental emission shall be at least 50 MHz. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the -10 dB minimum bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled and with the transmitter operating continuously at a fundamental frequency following the provisions of Section 15.31(m) of this part.

(c) Operation on board an aircraft or a satellite is prohibited. Devices operating under this section may not be employed for the operation of toys. Except for operation onboard a ship or a terrestrial transportation vehicle, the use of a fixed outdoor infrastructure is prohibited. A fixed infrastructure includes antennas mounted on outdoor structures, *e.g.*, antennas mounted on the outside of a building or on a telephone pole.

(d) Emissions from a transmitter operating under this section shall not exceed the following equivalent isotropically radiated power (EIRP) density levels:

(1) The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following RMS average limits based on measurements using a 1 MHz resolution bandwidth:

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-5925	-51.3
5925-7250	-41.3
7250-10600	-51.3
Above 10600	-61.3

(2) In addition to the radiated emission limits specified in the table in paragraph (d)(1) of this section, transmitters operating under the provisions of this section shall not exceed the following RMS average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

(3) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs and this 50 MHz bandwidth must be contained within the 5925-7250 MHz band. The peak EIRP limit is $20 \log (RBW/50)$ dBm where RBW is the resolution bandwidth in megahertz that is employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz. The video bandwidth of the measurement instrument shall not be less than RBW. If RBW is greater than 3 MHz, the application for certification filed with the Commission shall contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

(4) Radiated emissions at or below 960 MHz shall not exceed the emission levels in Section 15.209 of this part.

(5) Emissions from digital circuitry used to enable the operation of the transmitter may comply with the limits in Section 15.209 of this chapter provided it can be clearly demonstrated that those emissions are due solely to emissions from digital circuitry contained within the transmitter and the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in Section 15.3(k) of this chapter, *e.g.*, emissions from digital circuitry used to control additional functions or capabilities other than the operation of the transmitter, are subject to the limits contained in Subpart B of Part 15 of this chapter. Emissions from these digital circuits shall not be employed in determining the -10 dB bandwidth of the fundamental emission or the frequency at which the highest emission level occurs.

(e) Measurement procedures:

(1) All emissions at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Unless otherwise specified, all RMS average emission levels specified in this section are to be measured utilizing a 1 MHz resolution bandwidth with a one millisecond dwell over each 1 MHz segment. The frequency span of the analyzer should equal the number of sampling bins times 1 MHz and the sweep rate of the analyzer should equal the number of sampling bins times one millisecond. The provision in Section 15.35(c) of this part that allows emissions to be averaged over a 100 millisecond period does not apply to devices operating under this section. The video bandwidth of the measurement instrument shall not be less than the resolution bandwidth and trace averaging shall not be employed. The RMS average emission measurement is to be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

(2) The peak emission measurement is to be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

(3) For transmitters that employ frequency hopping, stepped frequency or similar modulation types, the peak emission level measurement, the measurement of the RMS average emission levels, and the measurement to determine the frequency at which the highest level emission occurs shall be made with the frequency hop or step function active. Gated signals may be measured with the gating active. The provisions of Section 15.31(c) of this part continue to apply to transmitters that employ swept frequency modulation.

(4) The -10 dB bandwidth is based on measurement using a peak detector, a 1 MHz resolution bandwidth, and a video bandwidth greater than or equal to the resolution bandwidth.

(5) Alternative measurement procedures may be considered by the Commission.

5. A new Section 15.252 is added to read as follows:

Section 15.252 Operation of wideband vehicular radar systems within the bands 16.2-17.7 GHz and 23.12-29.0 GHz.

(a) Operation under this section is limited to field disturbance sensors that are mounted in terrestrial transportation vehicles. Terrestrial use is limited to earth surface-based, non-aviation applications. Operation within the 16.2-17.7 GHz band is limited to field disturbance sensors that are used only for back-up assistance and that operate only when the vehicle is engaged in reverse.

(1) The -10 dB bandwidth of the fundamental emission shall be located within the 16.2-17.7 GHz band or within the 23.12-29.0 GHz band, exclusive of the 23.6-24.0 GHz restricted band, as appropriate, under all conditions of operation including the effects from stepped frequency, frequency hopping or other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

(2) The -10 dB bandwidth of the fundamental emission shall be 10 MHz or greater. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the -10 dB minimum bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled and with the transmitter operating continuously at a fundamental frequency following the provisions of Section 15.31(m) of this part.

(3) For systems operating in the 23.12-29.0 GHz band, the frequencies at which the highest average emission level and at which the highest peak level emission appear shall be greater than 24.075 GHz.

(4) These devices shall operate only when the vehicle is operating, *e.g.*, the engine is running. Operation shall occur only upon specific activation, such as upon starting the vehicle, changing gears, or engaging a turn signal. The operation of these devices shall be related to the proper functioning of the transportation vehicle, *e.g.*, collision avoidance.

(b) Emissions from a transmitter operating under this section shall not exceed the following equivalent isotropically radiated power (EIRP) density levels:

(1) For transmitters operating in the 16.2-17.7 GHz band, the RMS average radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following EIRP limits based on measurements using a 1 MHz resolution bandwidth:

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-16,200	-61.3
16,200-17,700	-41.3
Above 17,700	-61.3

(2) For transmitters operating in the 23.12-29.0 GHz band, the RMS average radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following EIRP limits based on measurements using a 1 MHz resolution bandwidth:

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-23,120	-61.3
23,120-23,600	-41.3
23,600-24,000	-61.3
24,000-29,000	-41.3
Above 29,000	-61.3

(3) In addition to the radiated emission limits specified in the tables in paragraphs (b)(1) and (b)(2) of this section, transmitters operating under the provisions of this section shall not exceed the following RMS average EIRP limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1164-1240	-85.3

1559-1610

-85.3

(4) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs and this 50 MHz bandwidth must be contained within the 16.2-17.7 GHz band or the 24.05-29.0 GHz band, as appropriate. The peak EIRP limit is $20 \log (\text{RBW}/50)$ dBm where RBW is the resolution bandwidth in MHz employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz. Further, RBW shall not be greater than the -10 dB bandwidth of the device under test. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the -10 dB minimum bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled and with the transmitter operating continuously at a fundamental frequency. The video bandwidth of the measurement instrument shall not be less than RBW. The limit on peak emissions applies to the 50 MHz bandwidth centered on the frequency at which the highest level radiated emission occurs. If RBW is greater than 3 MHz, the application for certification shall contain a detailed description of the test procedure, the instrumentation employed in the testing, and the calibration of the test setup.

(5) Radiated emissions at or below 960 MHz shall not exceed the emission levels in Section 15.209 of this part.

(6) Emissions from digital circuitry used to enable the operation of the transmitter may comply with the limits in Section 15.209 of this chapter provided it can be clearly demonstrated that those emissions are due solely to emissions from digital circuitry contained within the transmitter and the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in Section 15.3(k) of this chapter, *e.g.*, emissions from digital circuitry used to control additional functions or capabilities other than the operation of the transmitter, are subject to the limits contained in Subpart B of Part 15 of this chapter. Emissions from these digital circuits shall not be employed in determining the -10 dB bandwidth of the fundamental emission or the frequency at which the highest emission level occurs.

(c) Measurement procedures:

(1) All emissions at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Unless otherwise specified, all RMS average emission levels specified in this section are to be measured utilizing a 1 MHz resolution bandwidth with a one millisecond dwell over each 1 MHz segment. The frequency span of the analyzer should equal the number of sampling bins times 1 MHz and the sweep rate of the analyzer should equal the number of sampling bins times one millisecond. The provision in Section 15.35(c) of this part that allows emissions to be averaged over a 100 millisecond period does not apply to devices operating under this section. The video bandwidth of the measurement instrument shall not be less than the resolution bandwidth and trace averaging shall not be employed. The RMS average emission measurement is to be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

(2) The peak emission measurement is to be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

(3) For transmitters that employ frequency hopping, stepped frequency or similar modulation types, the peak emission level measurement, the measurement of the RMS average emission levels, the measurement to determine the center frequency, and the measurement to determine the frequency at which the highest level emission occurs shall be made with the frequency hop or step function active. Gated signals may be measured with the gating active. The provisions of Section 15.31(c) of this part continue to apply to transmitters that employ swept frequency modulation.

(4) The -10 dB bandwidth is based on measurement using a peak detector, a 1 MHz resolution bandwidth, and a video bandwidth greater than or equal to the resolution bandwidth.

(5) Alternative measurement procedures may be considered by the Commission.

6. Section 15.515 is amended by adding a new paragraph (g), to read as follows:

Section 15.515 Technical requirements for vehicular radar systems.

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(g) The emission levels from devices operating under the provisions of this section that employ gated transmissions may be measured with the gating active. Measurements made in this manner shall be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

7. Section 15.521 is amended by revising paragraph (d), to read as follows:

Section 15.521 Technical requirements applicable to all UWB devices.

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(d) Within the tables in Sections 15.509, 15.511, 15.513, 15.515, 15.517, and 15.519, the tighter emission limit applies at the band edges. Radiated emission levels at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Radiated emission levels above 960 MHz are based on RMS average measurements over a 1 MHz resolution bandwidth. The RMS average measurement is based on the use of a spectrum analyzer with a resolution bandwidth of 1 MHz, an RMS detector, and a 1 millisecond or less averaging time. Unless otherwise stated, if pulse gating is employed where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on. Alternative measurement procedures may be considered by the Commission.

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Appendix B
Comments and Reply Comments Filed in Response to the
Further Notice of Proposed Rule Making

Comments:

1. Delphi Automotive Systems Corporation ("Delphi")
2. James Page
3. Multispectral Solutions, Inc. ("MSSI")
4. National Academy of Sciences' Committee on Radio Frequencies ("CORF")
5. Short Range Automotive Radar Frequency Allocation Group ("SARA")
6. Siemens VDO Automotive AG ("Siemens VDO")

Reply Comments:

1. Delphi Automotive Systems Corporation ("Delphi")
2. James Page
3. Multispectral Solutions, Inc. ("MSSI")
4. Northrop Grumman Corporation and Raytheon Company ("Northrop Grumman and Raytheon")
5. Satellite Industry Association ("SIA")
6. Siemens VDO Automotive AG ("Siemens VDO")
7. XM Radio and Sirius Radio Inc. ("XM and Sirius")
8. XtremeSpectrum, Inc. ("XSI")

**STATEMENT OF
CHAIRMAN MICHAEL K. POWELL**

Re: Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems

This Commission has dedicated itself to incubating new technologies like ultra-wideband. Today we take additional steps to facilitate deployment of this groundbreaking and paradigm busting technology. Nearly two years ago we first adopted rules to permit several categories of ultra-wideband devices to operate under our Part 15 rules for use by consumers and non-Federal Government entities, including: imaging systems, vehicular radars, and indoor and outdoor communications systems.

Today, we amend our Part 15 non-UWB regulations to permit the use of peak emissions levels, similar to the levels applied to UWB devices. This will in turn provide greater flexibility for the introduction of new wide-bandwidth devices and systems. These new devices include radar systems to improve automotive safety and tracking systems for personnel location, such as hospital patients and emergency rescue crews, as well as for functions such as inventory control. Ultimately, this action will provide greater flexibility in the traditional Part 15 rules to facilitate the introduction of new equipment designs, a wider variety of products and increase consumer choices.